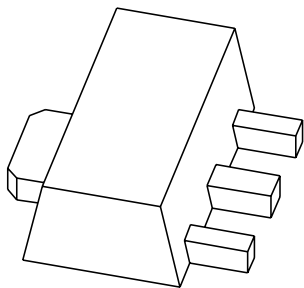


# DATA SHEET



**PBSS5350X**

**50 V, 3 A**

**PNP low  $V_{CEsat}$  (BISS) transistor**

Product specification  
Supersedes data of 2003 Jun 24

2003 Nov 21

50 V, 3 A  
PNP low  $V_{CEsat}$  (BISS) transistor

PBSS5350X

FEATURES

- SOT89 (SC-62) package
- Low collector-emitter saturation voltage  $V_{CEsat}$
- High collector current capability:  $I_C$  and  $I_{CM}$
- Higher efficiency leading to less heat generation
- Reduced printed-circuit board requirements.

APPLICATIONS

- Power management
  - DC/DC converters
  - Supply line switching
  - Battery charger
  - LCD backlighting.
- Peripheral drivers
  - Driver in low supply voltage applications (e.g. lamps and LEDs).
  - Inductive load driver (e.g. relays, buzzers and motors).

DESCRIPTION

PNP low  $V_{CEsat}$  transistor in a SOT89 plastic package.  
NPN complement: PBSS4350X.

MARKING

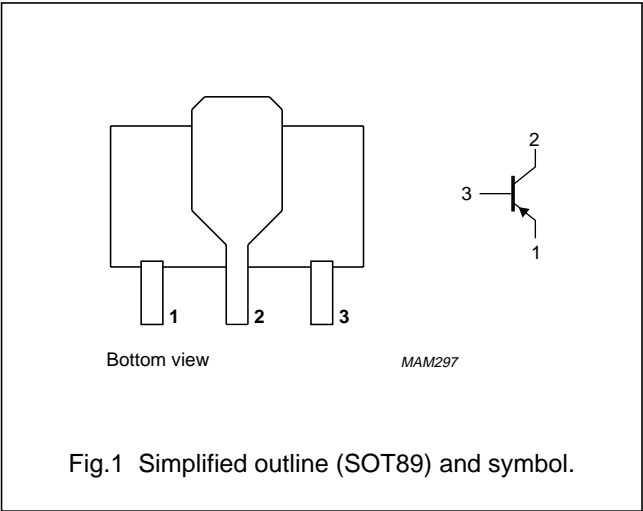
TYPE NUMBER	MARKING CODE
PBSS5350X	S46

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
$V_{CEO}$	collector-emitter voltage	-50	V
$I_C$	collector current (DC)	-3	A
$I_{CM}$	peak collector current	-5	A
$R_{CEsat}$	equivalent on-resistance	135	m $\Omega$

PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base



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**ORDERING INFORMATION**

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS5350X	–	plastic surface mounted package; collector pad for good heat transfer; 6 leads	SOT89

**LIMITING VALUES**

In accordance with the Absolute Maximum Rating System (IEC 60134).

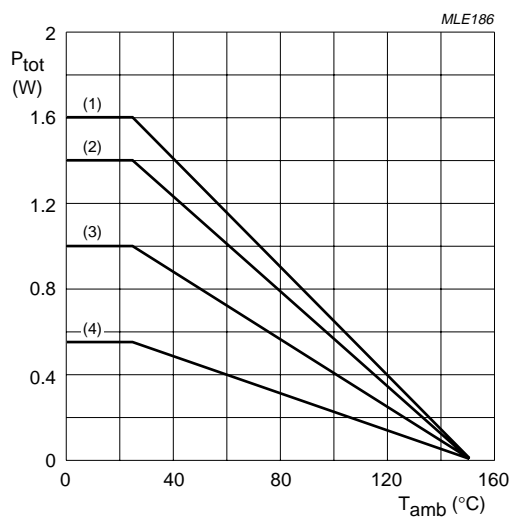
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	–50	V
$V_{CEO}$	collector-emitter voltage	open base	–	–50	V
$V_{EBO}$	emitter-base voltage	open collector	–	–5	V
$I_C$	collector current (DC)	note 4	–	–3	A
$I_{CM}$	peak collector current	limited by $T_{j\max}$	–	–5	A
$I_B$	base current (DC)		–	–0.5	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$			
		note 1	–	550	mW
		note 2	–	1	W
		note 3	–	1.4	W
		note 4	–	1.6	W
$T_j$	junction temperature		–	150	°C
$T_{amb}$	operating ambient temperature		–65	+150	°C
$T_{stg}$	storage temperature		–65	+150	°C

**Notes**

1. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; standard footprint.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; mounting pad for collector 1 cm<sup>2</sup>.
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; mounting pad for collector 6 cm<sup>2</sup>.
4. Device mounted on a ceramic printed-circuit board 7 cm<sup>2</sup>, single-sided copper, tinplated.

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- (1) Ceramic PCB; 7 cm<sup>2</sup> mounting pad for collector.      (3) FR4 PCB; 1 cm<sup>2</sup> copper mounting pad for collector.  
(2) FR4 PCB; 6 cm<sup>2</sup> copper mounting pad for collector.      (4) Standard footprint.

Fig.2 Power derating curves.

50 V, 3 A

PNP low  $V_{CEsat}$  (BISS) transistor

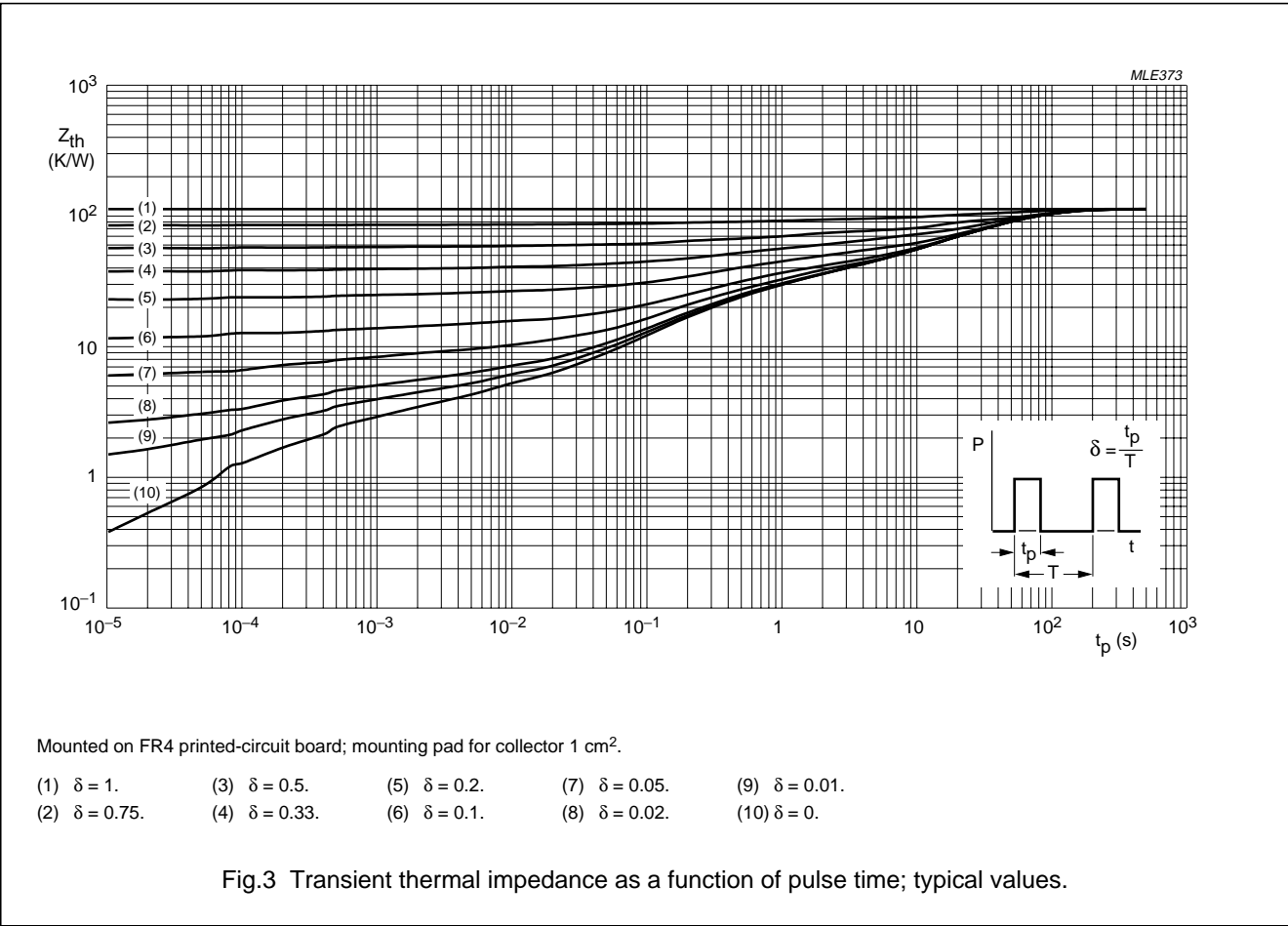
PBSS5350X

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient	in free air		
		note 1	225	K/W
		note 2	125	K/W
		note 3	90	K/W
		note 4	80	K/W
$R_{th\ j-s}$	thermal resistance from junction to soldering point		16	K/W

Notes

1. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; standard footprint.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; mounting pad for collector 1 cm<sup>2</sup>.
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; mounting pad for collector 6 cm<sup>2</sup>.
4. Device mounted on a ceramic printed-circuit board 7 cm<sup>2</sup>, single-sided copper, tinplated.



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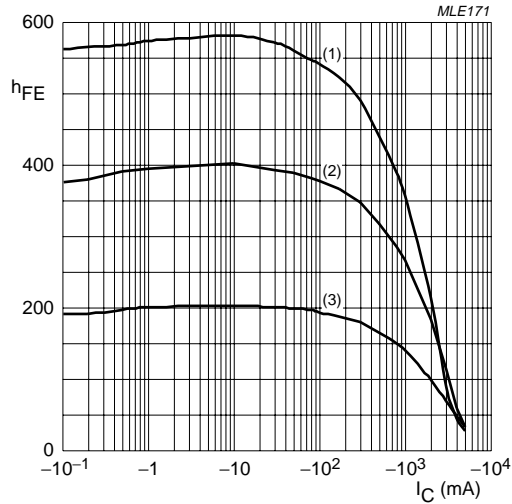
**CHARACTERISTICS** $T_j = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector cut-off current	$V_{CB} = -50\text{ V}; I_E = 0$	–	–	–100	nA
		$V_{CB} = -50\text{ V}; I_E = 0; T_j = 150\text{ }^{\circ}\text{C}$	–	–	–50	$\mu\text{A}$
$I_{CES}$	collector cut-off current	$V_{CE} = -50\text{ V}; V_{BE} = 0$	–	–	–100	nA
$I_{EBO}$	emitter cut-off current	$V_{EB} = -5\text{ V}; I_C = 0$	–	–	–100	nA
$h_{FE}$	DC current gain	$V_{CE} = -2\text{ V}$ $I_C = -0.1\text{ A}$	200	–	–	
		$I_C = -0.5\text{ A}$	200	–	–	
		$I_C = -1\text{ A}$ ; note 1	200	–	450	
		$I_C = -2\text{ A}$ ; note 1	130	–	–	
		$I_C = -3\text{ A}$ ; note 1	80	–	–	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -0.5\text{ A}; I_B = -50\text{ mA}$	–	–	–90	mV
		$I_C = -1\text{ A}; I_B = -50\text{ mA}$	–	–	–180	mV
		$I_C = -2\text{ A}; I_B = -100\text{ mA}$	–	–	–320	mV
		$I_C = -2\text{ A}; I_B = -200\text{ mA}$ ; note 1	–	–	–270	mV
		$I_C = -3\text{ A}; I_B = -300\text{ mA}$ ; note 1	–	–	–390	mV
$R_{CEsat}$	equivalent on-resistance	$I_C = -2\text{ A}; I_B = -200\text{ mA}$ ; note 1	–	90	135	$\text{m}\Omega$
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -2\text{ A}; I_B = -100\text{ mA}$	–	–	–1.1	V
		$I_C = -3\text{ A}; I_B = -300\text{ mA}$ ; note 1	–	–	–1.2	V
$V_{BEon}$	base-emitter turn-on voltage	$V_{CE} = -2\text{ V}; I_C = -1\text{ A}$	–1.1	–	–	V
$f_T$	transition frequency	$I_C = -100\text{ mA}; V_{CE} = -5\text{ V};$ $f = 100\text{ MHz}$	100	–	–	MHz
$C_c$	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_e = 0; f = 1\text{ MHz}$	–	–	35	pF

**Note**1. Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

50 V, 3 A  
PNP low  $V_{CEsat}$  (BISS) transistor

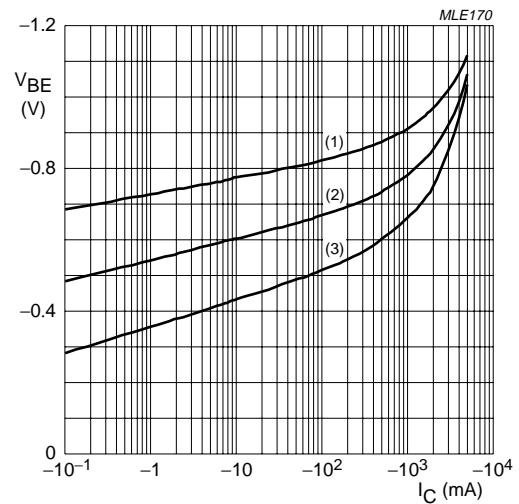
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$V_{CE} = -2$  V.

- (1)  $T_{amb} = 100$  °C.
- (2)  $T_{amb} = 25$  °C.
- (3)  $T_{amb} = -55$  °C.

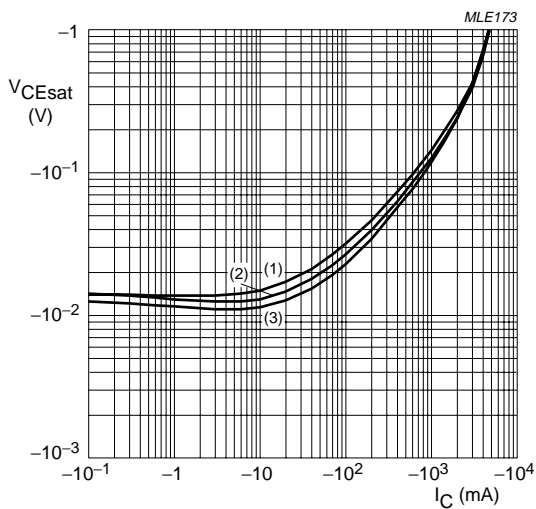
Fig.4 DC current gain as a function of collector current; typical values.



$V_{CE} = -2$  V.

- (1)  $T_{amb} = -55$  °C.
- (2)  $T_{amb} = 25$  °C.
- (3)  $T_{amb} = 100$  °C.

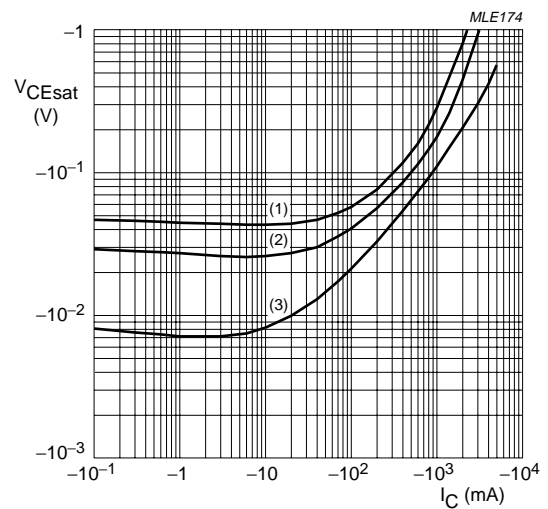
Fig.5 Base-emitter voltage as a function of collector current; typical values.



$I_C/I_B = 20$ .

- (1)  $T_{amb} = 100$  °C.
- (2)  $T_{amb} = 25$  °C.
- (3)  $T_{amb} = -55$  °C.

Fig.6 Collector-emitter saturation voltage as a function of collector current; typical values.



$T_{amb} = 25$  °C.

- (1)  $I_C/I_B = 100$ .
- (2)  $I_C/I_B = 50$ .
- (3)  $I_C/I_B = 10$ .

Fig.7 Collector-emitter saturation voltage as a function of collector current; typical values.

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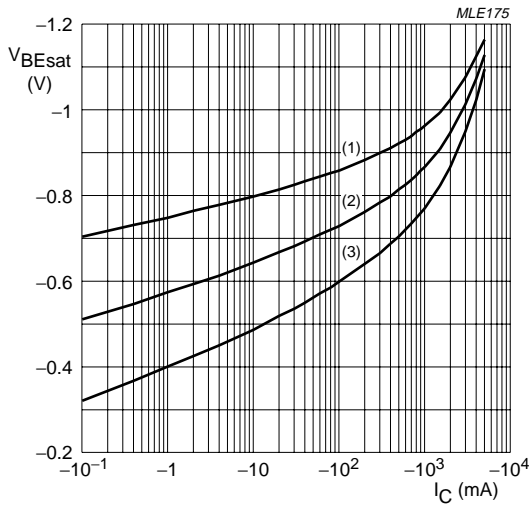
 $I_C/I_B = 20$ .(1)  $T_{amb} = -55\text{ °C}$ . (2)  $T_{amb} = 25\text{ °C}$ . (3)  $T_{amb} = 100\text{ °C}$ .

Fig.8 Base-emitter saturation voltage as a function of collector current; typical values.

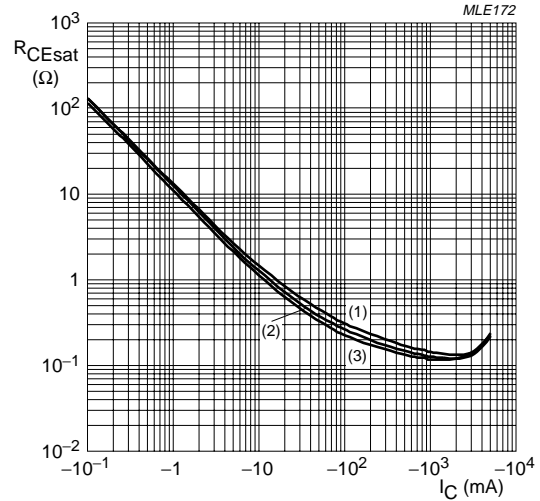
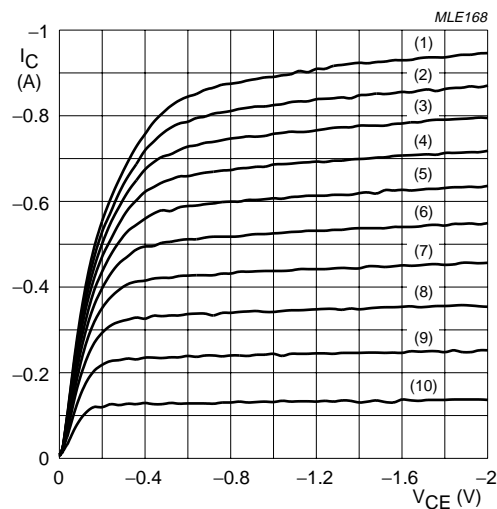
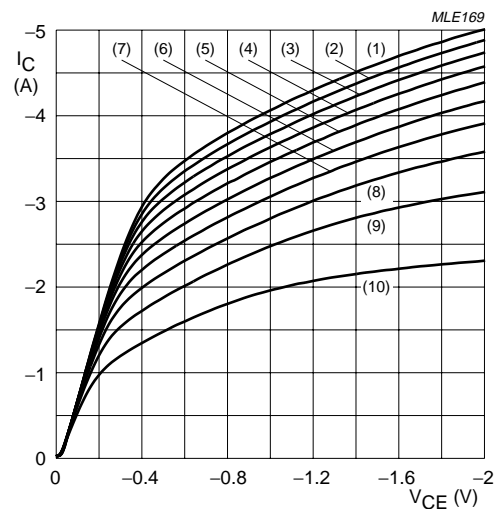
 $I_C/I_B = 20$ .(1)  $T_{amb} = 150\text{ °C}$ . (2)  $T_{amb} = 25\text{ °C}$ . (3)  $T_{amb} = -55\text{ °C}$ .

Fig.9 Collector-emitter equivalent on-resistance as a function of collector current; typical values.

 $T_{amb} = 25\text{ °C}$ .

(1) $I_B = -3500\text{ μA}$ .	(5) $I_B = -2100\text{ μA}$ .	(9) $I_B = -700\text{ μA}$ .
(2) $I_B = -3150\text{ μA}$ .	(6) $I_B = -1750\text{ μA}$ .	(10) $I_B = -350\text{ μA}$ .
(3) $I_B = -2800\text{ μA}$ .	(7) $I_B = -1400\text{ μA}$ .	
(4) $I_B = -2450\text{ μA}$ .	(8) $I_B = -1050\text{ μA}$ .	

Fig.10 Collector current as a function of collector-emitter voltage; typical values.

 $T_{amb} = 25\text{ °C}$ .

(1) $I_B = -140\text{ mA}$ .	(5) $I_B = -84\text{ mA}$ .	(9) $I_B = -28\text{ mA}$ .
(2) $I_B = -126\text{ mA}$ .	(6) $I_B = -70\text{ mA}$ .	(10) $I_B = -14\text{ mA}$ .
(3) $I_B = -112\text{ mA}$ .	(7) $I_B = -56\text{ mA}$ .	
(4) $I_B = -98\text{ mA}$ .	(8) $I_B = -42\text{ mA}$ .	

Fig.11 Collector current as a function of collector-emitter voltage; typical values.



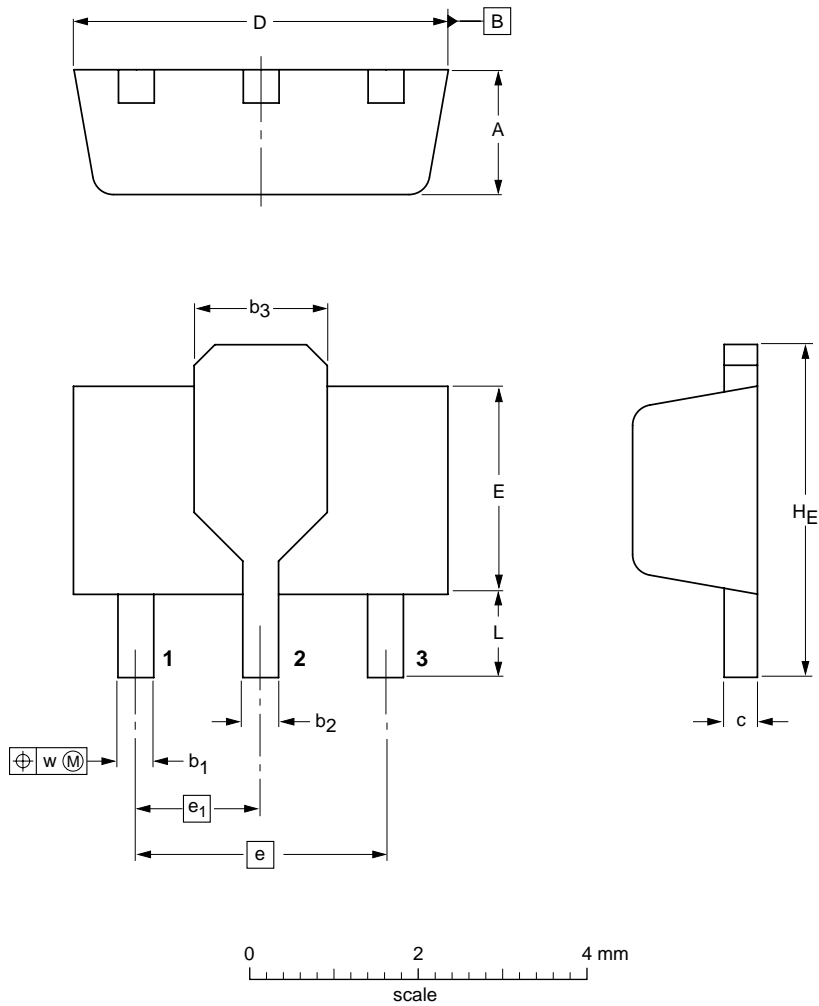
50 V, 3 A  
PNP low  $V_{CEsat}$  (BISS) transistor

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PACKAGE OUTLINE

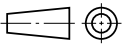
Plastic surface mounted package; collector pad for good heat transfer; 3 leads

SOT89



DIMENSIONS (mm are the original dimensions)

UNIT	A	b <sub>1</sub>	b <sub>2</sub>	b <sub>3</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L min.	w
mm	1.6 1.4	0.48 0.35	0.53 0.40	1.8 1.4	0.44 0.37	4.6 4.4	2.6 2.4	3.0	1.5	4.25 3.75	0.8	0.13

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT89		TO-243	SC-62			97-02-28 99-09-13

# 50 V, 3 A PNP low $V_{CEsat}$ (BISS) transistor

PBSS5350X

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